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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/698,040

10/30/2003

David Hait

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New York, NY 10036

EXAMINER

SEE, CAROL A

ART UNIT

PAPER NUMBER

3693

MAIL DATE

DELIVERY MODE

10/15/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/698,040	Applicant(s) HAIT, DAVID	
	Examiner Carol See	Art Unit 3693	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/13/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/13/2010 has been entered.

Response to Amendment

2. Examiner acknowledges Applicant's Arguments/Remarks, submitted 5/13/2010, which have amended claims 10-15 and 17-22 and added new claims 26-28.
3. Examiner further acknowledges the interview summary presented by Applicant. however, an agreement regarding claim 28 was not reached at that time.
4. Amended claims 11-13 overcome previous objections, which are hereby withdrawn.
5. Amended claim 12 overcomes previous rejection under 35 USC 112, which is hereby withdrawn.
6. Amended claim 17 overcomes previous rejection under 35 USC 101, which is hereby withdrawn.
7. Claims 10-28 are currently pending in this action.

Response to Arguments

8. Applicant's arguments filed 5/13/2010 have been fully considered, but are moot in view of the new grounds of rejection.

Information Disclosure Statement

9. The information disclosure statement (IDS) submitted on 5/13/2010 was filed after the mailing date of the final Office Action on 1/13/2010. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

10. Claims 11, 12, 13 and 26 are objected to because of the following informalities: independent claim 10 cites a machine with a computing device configured to perform certain actions, but claims 11, 12, 13 and 26 fail to mirror the language. Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 10 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. Claims 11-16, 24 and 26 are rejected as depending from claim 10. Claims 18-23, 25 and 27 are rejected as depending from claim 17.

Re claims 10 and 17: it is unclear as to the meaning of “using a function of the values for node vega computed at the nodes” and “using a function of the value of vega computed for the binomial tree.” What are these functions? How is this done?

Further, re claims 24 and 25: it is unclear as to the meaning of “using a recursive function of the values for node vega computed at the nodes.” What is this function? How is this done?

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 10-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Widdicks (On the Enhanced Convergence...Option Pricing, 2002) in view of Rubinstein (Implied Binomial Trees, 1994) and further in view of Breen (The Accelerated Binomial Option Pricing Model, 1991).

Re claim 10: Widdicks shows a machine comprising:

a computing device (pg. 336-337, referencing computational time and program code, indicating a computing device that runs with this programming code) for determining an implied volatility of an American option that can be exercised prior to the

time when the option expires, wherein said device is configured to:

generate a binomial tree having a plurality of nodes, each node corresponding to a different sub-period of time during which the American option can be exercised prior to the time when the option expires (pgs. 332-333, 336-337, fig. 2, showing generating binomial tree with plurality of nodes that show times at which option can be exercised). Widdicks further shows binomial trees can be used to calculate vega (pg. 336, showing binomial tree can be used to calculate the Greeks, which includes vega).

Widdicks does not expressly show a computing device configured to compute a value for node vega at each node of the binomial tree for the corresponding sub-period of time; or to compute a value for vega for the binomial tree using a function of the values for node vega computed at the nodes, or to compute a value for the implied volatility of the American option using a function of the value of vega computed for the binomial tree. Rubinstein shows computing a value for volatility at each node of a binomial tree for a corresponding period of time (pgs. 25). As it is well known in the art that vega refers to a change in the value of an option for a change in the volatility of the underlying asset, further manipulating the mathematical relationship allows for calculation of vega (which is also a node of the binomial tree, i.e., the final calculation of the tree) and other node vegas. From the values of volatility at the nodes, changes in the volatility over periods of time can be determined, as can vega, if change in prices is also known. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have recognized that the mathematical relationships represented in the binomial tree of Widdicks, allow for further manipulation as is well

within the capability of one of ordinary skill in the art, as shown in Rubinstein, in order to incorporate all necessary and valid parameters in accurate options pricing.

Breen shows further determinations in a binomial tree between each node provide for the changes of option price at different points in time at which an option may be exercised (pg. 154). As price and volatility are calculated at each node, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to further manipulate the mathematical relationships shown in Widdicks in view of Rubinstein, in the manner shown in Breen, in order to incorporate all necessary and valid parameters in accurate options pricing.

The recitation "for determining an implied volatility of an American option that can be exercised prior to the time when the option expires" has not been given patentable weight because the recitation is a statement of intended use that merely recites the intended use of a structure.

Re claim 11: Widdicks in view of Rubinstein and further in view of Breen shows the machine of claim 10. Breen further shows wherein the value for node vega at each node is the exact derivative of the option price with respect to the volatility when the option is not exercised at the sub-period of time corresponding to the node (pg. 154, 156-8, showing for American options, determining holding – i.e., non-exercise value at each node). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have incorporated into the configuration to calculate option pricing parameters, of Widdicks in view of Rubinstein and further in view of Breen, the

ability to determine option exercise prices, as shown in Breen, in order to assist a user to determine a beneficial time to exercise or to continue to hold an option.

Re claim 12: Widdicks in view of Rubinstein and further in view of Breen shows the machine of Claim 10. Breen further shows wherein the value for node vega at each node is the security price of the option when the option is exercised at a sub-period of time corresponding to the node (pg. 154, 156-8, showing for American options, determining exercise value at each node). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have further incorporated into the configuration to calculate option pricing parameters, of Widdicks in view of Rubinstein and further in view of Breen, the ability to determine option exercise prices, shown in Breen, in order to assist a user to determine a beneficial time to exercise or to continue to hold an option.

. Re claim 13: Widdicks in view of Rubinstein and further in view of Breen shows the machine of claim 12. Widdicks further shows a binomial tree applicable across a wide range of options, which broad category encompasses an index (pg. 316). Breen further shows wherein the computing device computes the value for node vega at each node as a function of the index price of the option when the option is exercised at a sub-period of time corresponding to the node (pg. 154, 156-8, showing for American options, determining exercise value at each node). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have further incorporated into the configuration to calculate option pricing parameters, of Widdicks in view of Rubinstein and further in view of Breen, the ability to determine option exercise prices,

shown in Breen, in order to assist a user to determine a beneficial time to exercise or to continue to hold an option.

Re claim 14: Widdicks in view of Rubinstein and further in view of Breen shows the machine of Claim 10. Rubenstein further shows wherein said computing device is configured to calculate the implied volatility of the American option iteratively using new values for node vega in each iteration until the computed price of the American option converges to the market price of the American option (pg. 25, showing use of binomial tree repeated, and computing a value for volatility at each node of a binomial tree for a corresponding period of time (pgs. 25)). As it is well known in the art that vega refers to a change in the value of an option for a change in the volatility of the underlying asset, further manipulating the mathematical relationship allows for calculation of node vegas. From the values of volatility and vega at the nodes, changes in the volatility and vega over periods of time can be determined. Alternatively, Examiner notes that it is well known in the art that use of binomial trees in option pricing is an iterative technique.

Re claim 15: Widdicks in view of Rubinstein and further in view of Breen shows the machine of claim 14. Widdicks further shows wherein said computing device is configured to calculate the new values for implied volatility in each iteration using the Newton-Raphson method (pg. 327). Alternatively, Examiner notes that Newton-Raphson method is a numerical optimization technique well known in the art.

Re claim 16: Widdicks in view of Rubinstein and further in view of Breen shows the machine of claim 10. Breen further shows wherein said computing device is configured to calculate the price of the option at each node (pg. 154, 156-8, showing for

American options, determining holding – i.e., non-exercise value at each node and showing determining exercise value at each node). Examiner notes that, as Widdicks in view of Rubinstein and further in view of Breen shows calculation of vega and option prices using binomial tree, it would have been obvious to one of ordinary skill in the art to recognize that the programming parameters could be made to perform calculations in any order or at any time desired by the user.

The limitations of claims 17-23 closely parallel the limitations of claims 10-16, and are therefore rejected under the same rationale.

Re claim 24: Widdicks in view of Rubinstein and further in view of Breen shows the machine of claim 10. Rubinstein further shows computing a value for volatility at each node of a binomial tree for a corresponding period of time (pgs. 25) and using a recursive function of the values computed at nodes (pg. 32, showing working recursively to compute a value for a binomial tree working backwards recursively from the end of the binomial tree). As it is well known in the art that vega refers to a change in the value of an option for a change in the volatility of the underlying asset, further manipulating the mathematical relationship allows for calculation of vega (which is also a node of the binomial tree, i.e., the final calculation of the tree) and other node vegas. From the values of volatility at the nodes, node vegas can be determined, if change in prices is also known. Breen further shows determinations in a binomial tree between each node provide for the changes of option price at different points in time at which an option may be exercised (pg. 154). As price and volatility are calculated at each node, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention

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to further manipulate the mathematical relationships shown in Widdicks in view of Rubinstein, in the manner shown in Breen, in order to incorporate all necessary and valid parameters in accurate options pricing.

The limitations of claim 25 closely parallel the limitations of claim 24, and are therefore rejected under the same rationale.

Re claim 26 (New): Widdicks in view of Rubinstein and further in view of Breen shows the machine of Claim 10. Breen further shows wherein said computing device computes a value for the option price at each node (pg. 154, 156-8). Rubinstein further shows node values for volatility for the corresponding sub-period of time are computed (pgs. 25, 32, showing computing volatility and working recursively to compute a value for a binomial tree, which incorporates using subsequent values for calculation). As it is well known in the art that vega refers to a change in the value of an option for a change in the volatility of the underlying asset, further manipulating the mathematical relationship allows for calculation of node vegas, using the option price. It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have recognized that the mathematical relationships represented in the binomial tree of Widdicks in view of Rubinstein, allow for further manipulation as is well within the capability of one of ordinary skill in the art, as shown in Breen, in order to incorporate all necessary and valid parameters in accurate options pricing.

The limitations of claim 27 closely parallel the limitations of claim 26, and are therefore rejected under the same rationale.

Re claim 28 (New): Widdicks shows a machine comprising:

a computing device for determining implied volatility of an American option (pg. 336-337, referencing computational time and program code, indicating a computing device that runs with this programming code), wherein said device is configured to:

iteratively generate a new tree for each new value of volatility, the tree having a plurality of nodes, each node corresponding to a different sub-period of time during which the American option can be exercised prior to the time when the option expires (pgs. 332-333, 336-337, fig. 2, showing generating binomial tree with plurality of nodes that show times at which option can be exercised). Widdicks further shows binomial trees can be used to calculate vega (pg. 336, showing binomial tree can be used to calculate the Greeks, which includes vega).

Widdicks does not expressly show a computing device configured to calculate a value of vega for each tree using values of the option price calculated at nodes of a single tree; and calculate the implied volatility of the option using a function of the values calculated for vega for the trees. Rubinstein shows computing a value for volatility at each node of a binomial tree for a corresponding period of time (pgs. 25), and further shows a final implied volatility (i.e., end node) (pg. 25). As it is well known in the art that vega refers to a change in the value of an option for a change in the volatility of the underlying asset, further manipulating the mathematical relationship allows for calculation of vega (which is also a node of the binomial tree, i.e., the final calculation of the tree) and other node vegas. From the values of volatility at the nodes, changes in the volatility over periods of time can be determined, as can vega, if change in prices is also known. It would have been obvious to one of ordinary skill in the art at the time of

Applicant's invention to have recognized that the mathematical relationships represented in the binomial tree of Widdicks, allow for further manipulation as is well within the capability of one of ordinary skill in the art, as shown in Rubinstein, in order to incorporate all necessary and valid parameters in accurate options pricing.

Widdicks in view of Rubinstein does not expressly show option prices calculated at nodes of a binomial tree. Breen shows further determinations in a binomial tree between each node provide for the changes of option price at different points in time at which an option may be exercised (pg. 154). As price and volatility are calculated at each node, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to further manipulate the mathematical relationships shown in Widdicks in view of Rubinstein, in the manner shown in Breen, in order to incorporate all necessary and valid parameters in accurate options pricing.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol See whose telephone number is (571)272-9742. The examiner can normally be reached on Monday - Thursday 6:45 am - 5:15 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Kramer, can be reached on (571) 272-6783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Carol See/
Examiner, Art Unit 3693

/Rajesh Khattar/
Primary Examiner, Art Unit 3693